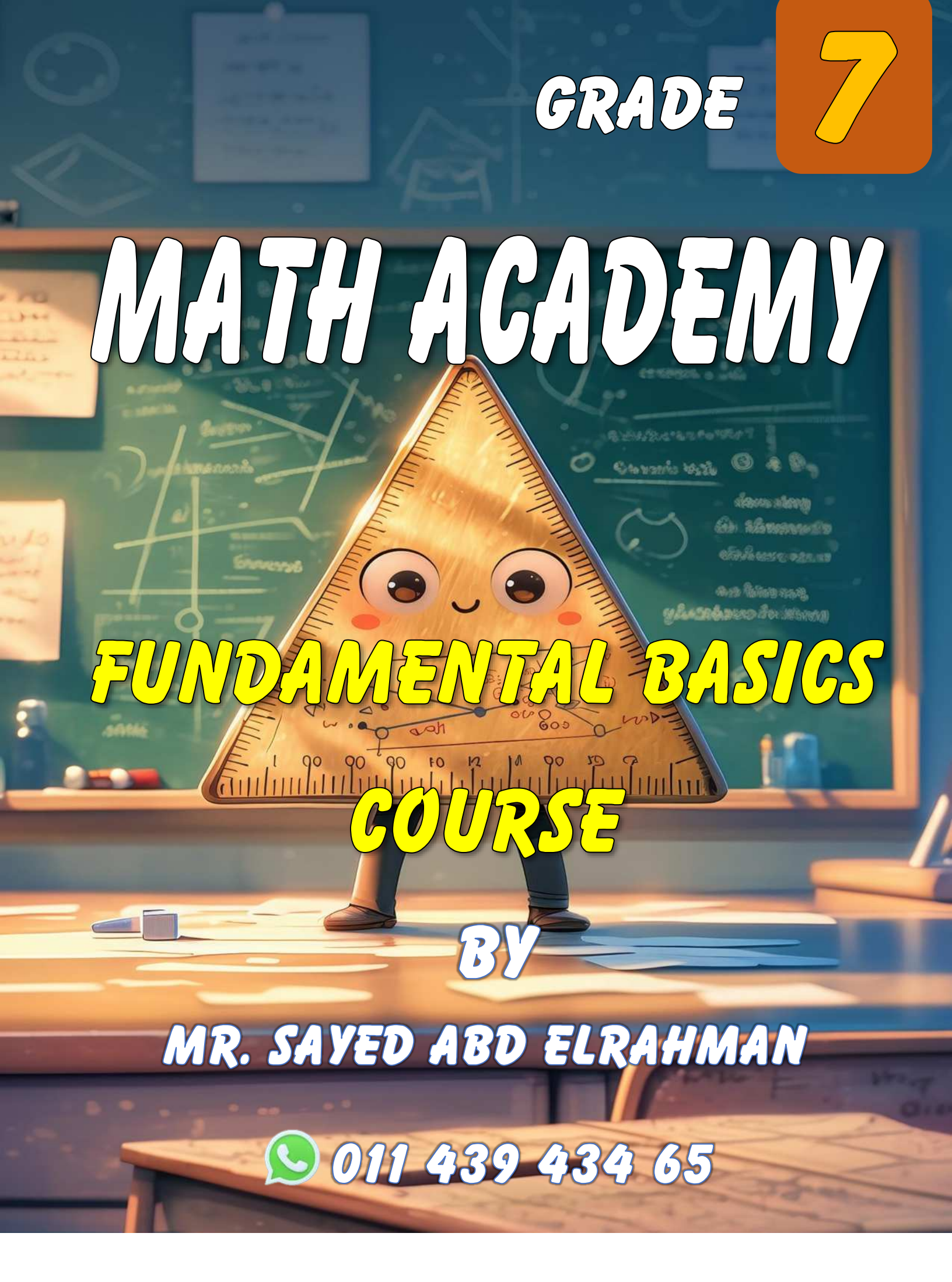
GRADE 7

MATH ACADEMY



FUNDAMENTAL BASICS COURSE

BY

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Numbering Skill

Ratio: It is a method of comparing two quantities of the same kind.

You can express the ratio between a and b in each of the following form $\frac{a}{b}$ or a : b

Rate: It is a ratio that compares two quantities with different units of measurement.

Ex1: Find each ratio in simplest form:

a. **18: 48**

b. **30: 20**

Ex2: If Wael has 40 LE. and Ahmed has 32 LE. Find:

a. **The ratio between what Wael has and what Ahmed has in simplest form.**

b. **The ratio between what Ahmed has and what Wael has in simplest form.**

c. **The ratio between what Wael has and the total sum of money in simplest form.**

Ex3: The ratio of small dogs to large dogs at the dog show is 5 : 4. If there are 27 dogs in the show, how many Large dogs are there?

Ex4: **If the ratio between what Ahmed saved and what his sister Sarah saved was 9: 4 and what Ahmed saved was 81 L.E., find what Sarah saved.**

_____

_____

_____

If $\frac{a}{b} = \frac{c}{d}$

then Product of Extremes= Product of Means

then: a × d = b × c

Ex5: **Find the value of X:**

a) $\frac{6}{9} = \frac{10}{x}$

b) $\frac{x}{14} = \frac{15}{21}$

Percentage: It is a ratio where the second term equals 100

Ex6: **Convert each of the following into a percentage:**

a. 0.3 **b. 0.45** **c. 1.2**

d. $\frac{2}{5}$ **e.** $2\frac{1}{4}$

Ex7: **Complete the following:**

a) 30 % + 15 % = ... %

b) 35 % + 25 % = ...

c) 100 % - (20 % + 45 %) = ...%

d) 1 – (15 % + 35 %) = ...

e) 40 % of 8000 = ...

f) 10 % + 15 % + $\frac{1}{4}$ = ... %

Ex8: If you stored 64 boxes of merchandise which is 40% of the total number of boxes. What is the total number of boxes?

Ex9: Sandy ate 6 oranges from 20 oranges on a plate. What is the percent of the orange Sandy ate?

Ex10: A hand mixer costs 400 LE. There is 80 LE. discount on it. What is the discount percentage?

Ex10: A man bought a T.V. set. He was given a 15% discount of its marked price which was 17,000 L.E. Find its price after discount.

Ex11: If a man deposited 20, 000 LE. in a bank with annual interest 15 %. Find the total amount which he gets at the end of one year.

The counting numbers are: 1 , 2 , 3 , 4 , 5 , ...

The natural numbers are: 0 , 1 , 2 , 3 , 4 , ...

The integer numbers are: ....., -3 , -2 , -1 , 0 , 1 , 2 , 3 , 4 , ...

The non-negative integers are: 0 , 1 , 2, 3, 4, ...

The non-positive integers are: 0 , - 1 , - 2 , - 3 , - 4,....

... ,-4 ,-3 ,-2 ,-1 ,0 ,1,2 ,3 ,4 , ...

Negative Integers | Zero (neither positive nor negative) | Positive Integers

Additive Inverse (opposite) Any two numbers on the number line that are at the same distance from zero and in opposite directions are called additive inverses of each other.

For example: The numbers (4 and – 4) are at the same distance from zero and in opposite directions.

Note that: The additive inverse of 0 is 0

Absolute Value The absolute value of an integer is the distance between the number and zero, so the absolute value is always either positive or zero.

For example: I 5 I= 5 , I -5 I= 5 Note that : I 0 I = 0

A rational number is any number that can be written in the form $\frac{a}{b}$, where a and bare integers and b $\neq$ 0

Ex1: Write belongs or does not belong:

a. -3 to set of natural numbers

b. 3.17 to set of integers.

c. 0 to set of natural numbers.

d. $\frac{4}{7}$ to set of rational numbers

Ex2: Write a subset or not a subset:

a. Set of rational numbers of set of natural numbers.

b. Set of counting numbers of set of natural numbers.

c. Set of integers of set of rational numbers.

Ex3: Write the correct sign (> , < or =).

a. $-\frac{1}{2}$ ◯ zero

b. $-\frac{3}{4}$ ◯ $\frac{1}{4}$

c. $-4\frac{1}{2}$ ◯ -5

d. $\frac{3}{2}$ ◯ $\frac{1}{2}$

e. $\frac{1}{4}$ ◯ $\frac{1}{6}$

f. $-\frac{5}{7}$ ◯ $-\frac{3}{2}$

Equations: It is a mathematicl sentence has equal sign.

Ex1: Solve each of the following equations:

a. $X-5=2$

b. $x+1=5$

c. $3x=9$

d. $\frac{x}{4}=6$

Inequality: It is a mathematical sentence that contains $<$, $>$, $\leq$, $\geq$

Ex2: Write two possible solutions for each of the following inequalities:

a. $X<10$

b. $X\geq 3$

Exponent: is a mathematical form for the repeated multiplication focus on repeated factor which is called "base" and number of times the base is used as a factor is called "exponent", "power" or "index"

$2 \times 2 \times 2 \times 2 = 2^4$

Expressions:

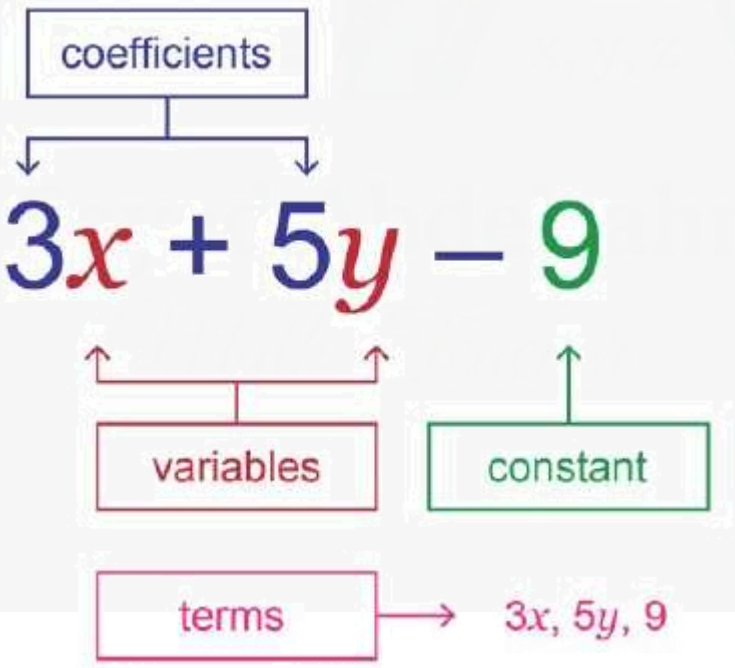
Numeric expressions: Are statements that contain only numbers separated by one or more operations from +, - , × and +

Algebraic expressions: Are statements that contain numbers and symbols (variables) separated by one or more operations from + , - , × and +

Constant: It is the term that doesn't contain variable.

Coefficient: It is the number that is multiplied by the variable.

Like terms: Algebraic terms of the same variables are like.



Addition	Subtraction	Multiplication	Division
add	subtract	multiplied by	divide
sum	difference	product of	quotient
increased by	decreased by	times	per
more than	fewer	double	divided equally
exceeds	less than	triple	split into
total	diminished by	twice	fraction
plus	minus		ratio of
in all	take away		half
gain	withdraw		third
deposit	reduced by		
	magnitude of increase		

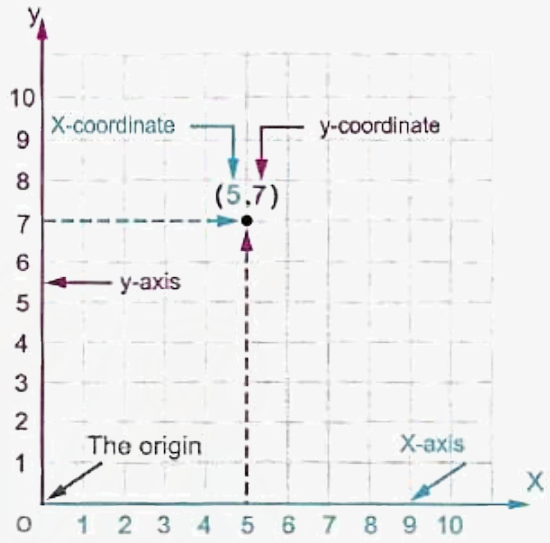
Ex1: Write an algebraic expression for each of the following verbal expressions.

a. Add 6 to the number x
b. Subtract 3 from the number y
c. Multiply 5 by the number z
d. Divide the number m by 3
e. a number less than ten.
f. a number less ten.
g. Nine more than a number x
h. Subtract a number t from 24
i. Three times a number y
j. Product of a number p and 7.5
k. Quotient of a number h by 9

Shape and Space Skill

• The coordinate plane

The coordinate plane is the plane determined by a horizontal line , called the x-axis , and a vertical line , called the y-axis , intersecting at a point , called **the origin.**
It is labeled as "**O**"

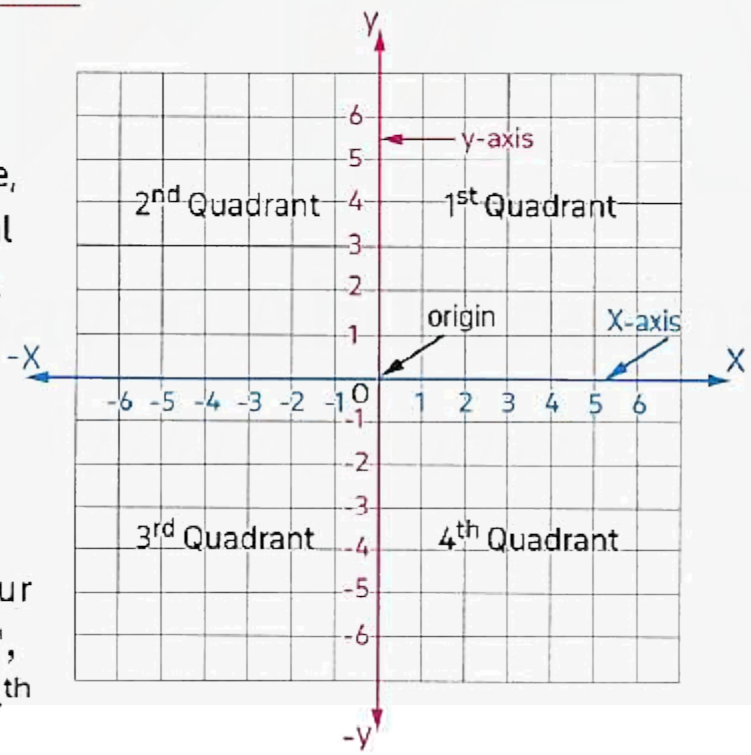


• The ordered pair

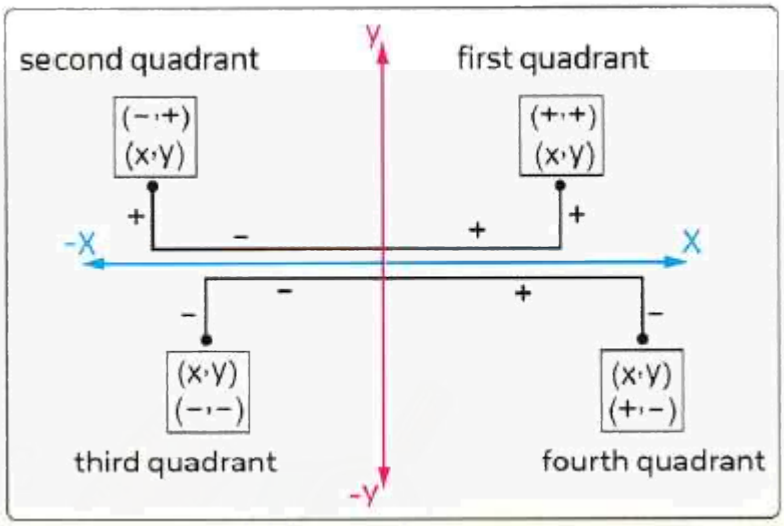
The ordered pair is a pair of numbers used to locate any point on a coordinate plane.
Ordered pairs are written left to right (x , y)

• The coordinate plane

- The coordinate plane is a plane containing a horizontal number line, the x-axis , and a vertical number line , the y-axis.
- The intersection point of these axes is called the origin "**O**"
- The axes divide the coordinate plane into four parts called "quadrants", which are 1st , 2nd , 3rd , 4th quadrant.



The position of any point in coordinate plane:



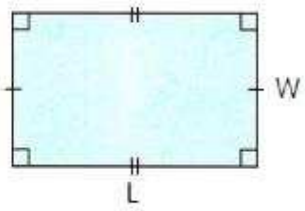
- The coordinates of the origin Oare (0, 0).
- If x = 0 , then the coordinates of the point are (0, y), this point lies on the y-axis.
- If y = 0 , then the coordinates of the point are (x, 0), this point lies on the x-axis.

Reflection:

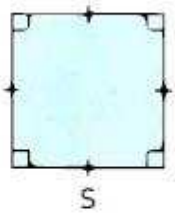
- The image of any point (x, y) by reflection across the y-axis is the point (-x , y)
- The image of any point (x, y) by reflection across the x- axis is the point (x, -Y)

Areas:

Area of rectangle
= length × width
= L × W



Area of square
= side length × side length
= S × S



The area of the parallelogram = the base Length x corresponding height

$A = b \times h$

The area of the rhombus= side Length "base" x height

$A = b \times h$

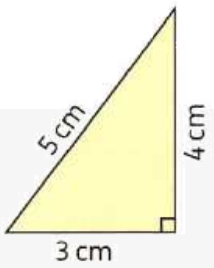
The area of the triangle= $\frac{1}{2}$ × the base length x height

$A = \frac{1}{2} \times b \times h$

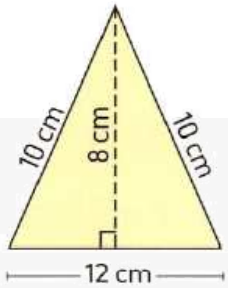
Ex1: Which one is greater: The area of a parallelogram whose base length is 15.7 cm and height 9.4 cm, or the area of a rhombus whose side length is 14 cm and height 10 cm

Ex2: Find the area of the following triangles:

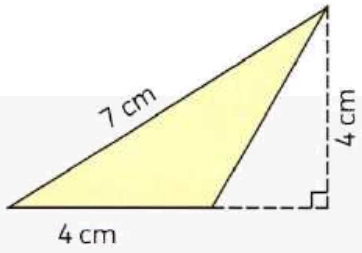
a



b

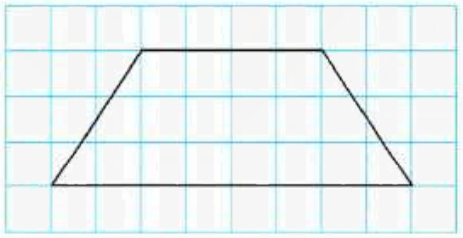


c

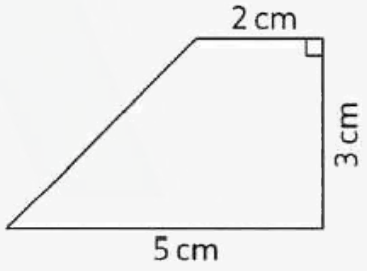


Ex3: Find the area of each of the following trapeziums.

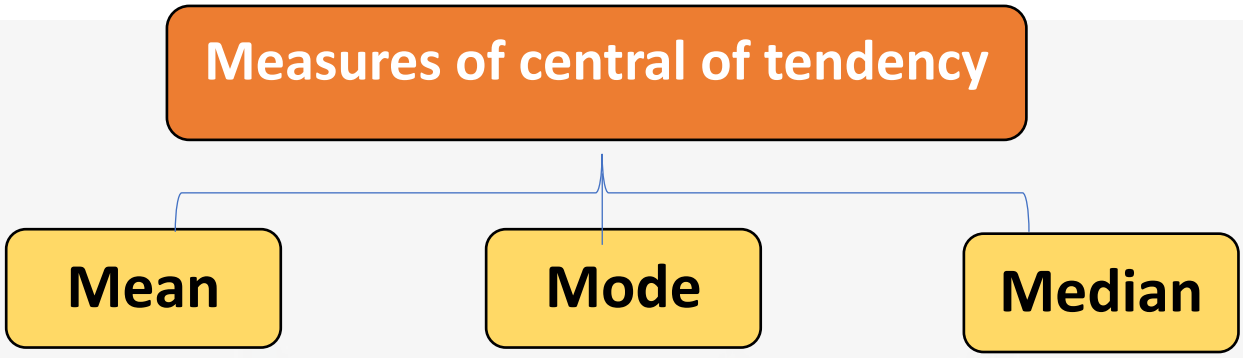
a



b



Data Handling Skill



$$\text{Mean} = \frac{\text{Sum of values}}{\text{number of values}}$$

Mode: it is the most repeated value

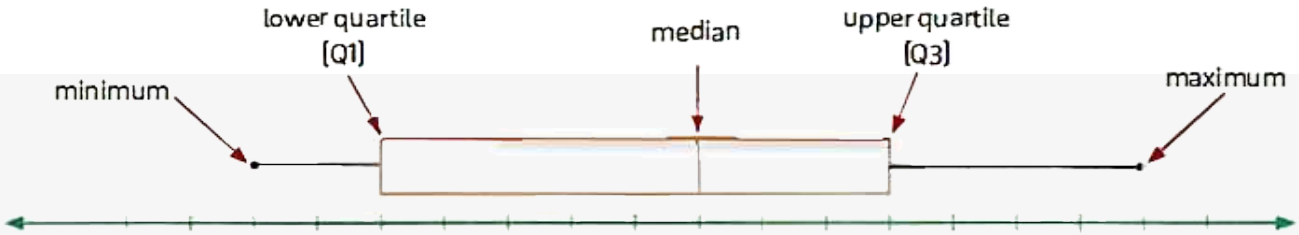
Median: It is the value in middle after re arrange values

Range = Max value - Min value

Ex1: Find Mean, mode, median and outliers for the set of data:

1 , 1 , 2 , 3 , 5 , 12

5 – number summary of the box plot



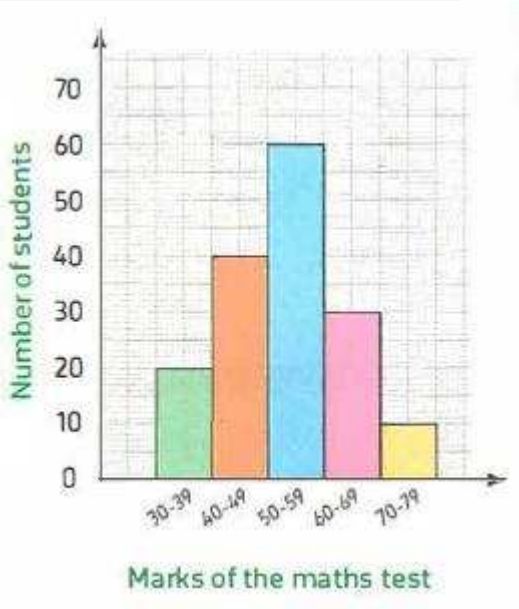
Ex2: Draw the box plot for the data set:

53 , 55 , 49 , 51 , 54 , 52 , 53 , 60 , 57

Histogram: A histogram displays data intervals along the x-axis and uses bars to represent the frequencies of values that fall into each interval.

Characteristics of histogram:

1. Title.
2. Two axes:
   - Horizontal axis to represent data grouped in intervals [classes].
   - Vertical axis has a scale.
3. Labels for each axis.
4. Shows numerical data.
5. Bars represent data.
6. No gaps between bars [unless data are not given in a specific interval].
7. Bars should not overlap.
8. Bars cannot be rearranged.



Ex3: **The table shows data about the total times that 40 students spent using their mobile phones one week:**

Time (hours)	2	3	4	5	6	7	8	9	12	13	14
Frequency	1	4	5	2	6	2	7	4	3	2	4

a. **Form the frequency table using the intervals (2 -3 , 4 -5 , 6 -7 , ...)**
b. **Draw histogram to represent this data.**